

# Energy

## Task 1: Energy in food and in fuels

Look at the table of information below and answer the questions.

Food or fuel	Energy (J/kg)
coal	30 000 000
wood	15 000 000
petrol	46 000 000
cheese	16 000 000
bread	9 500 000
lettuce	550 000

- 1** A new power station is opening in your local area. State the fuel you would choose for this power station using the table above. Explain your answer.

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Leon and James students are in the same class. Leon is very sporty while James likes to play on his games console in his spare time.

Their typical daily energy requirements are 8700 kJ and 12 400 kJ.

- 2 a** Link the correct energy requirement for each student.

Leon: \_\_\_\_\_

James:

- b** Describe the types of food you would recommend to Leon and James as part of their diet using the table above. Explain your answer.

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## Task 2: Conservation of energy

1 State the law of conservation of energy.

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2 A coal fire is burning in the fireplace. Describe the energy before and after this change.

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3 The diagram below shows a lever in action. Explain how this lever follows the law of conservation of energy.

Fill in the gaps using the following words:

**force multiplier    force    distance    pivot**  
**simple machine    bigger    smaller**

A lever is a \_\_\_\_\_ .

In this example, a screwdriver is used to open a paint tin.

The \_\_\_\_\_ is where the end of the screwdriver is resting on the edge of the paint tin. The

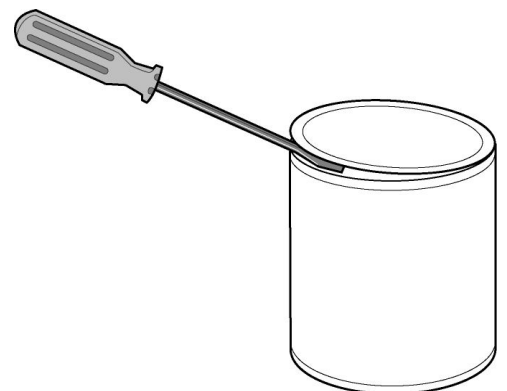
applied to the lid by the lever is \_\_\_\_\_ than the

that you apply with just your hand. This

means that a lever is a \_\_\_\_\_ .

Energy is conserved because the \_\_\_\_\_ the lid moves up is

\_\_\_\_\_ than the \_\_\_\_\_ moved by your hand.



### Task 3: Energy transfers

1 Link each key word with the correct definition provided.

energy

The energy in the store associated with the temperature of an object.

temperature

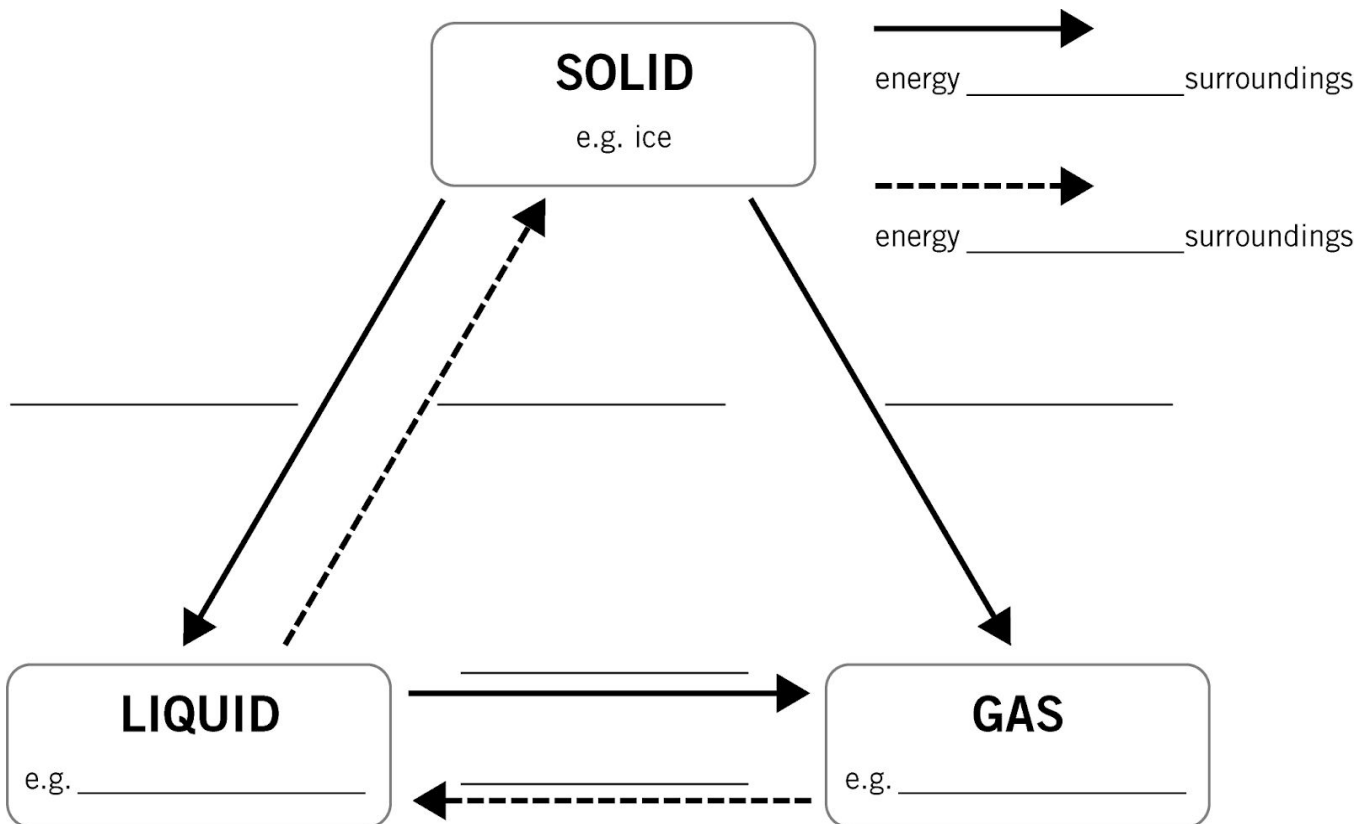
A measure associated with changes in temperature or with work, measured in joules.

internal energy

A measure of how hot or cold something is, measured in degrees Celsius.

2 Complete the diagram to describe what happens during changes of state. Fill in the gaps and label each arrow using the words and phrases below.

**melting**      **evaporation or boiling**      **sublimation**      **condensation**  
**freezing**      **to**      **from**      **water**      **steam**



3 Two objects are in contact with each other. Explain what brings about the transfer of energy between the two objects using the term **equilibrium**.

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4 Use the image below to answer the following questions.



- a Draw an arrow on the diagram to show the direction of energy transfer.
- b Describe how conduction occurs through the sides of the cup. You should include the phrase **vibration of particles** in your answer.

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- c Suggest a suitable material for the manufacture of this cup. Explain your answer in terms of conduction and insulation.

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- 5 a** Choose from the following list sources of infrared radiation.  
Circle the correct answers.

**ice cube      the Sun      a metal saucer      a lamp      a fire**

- b** Describe what all sources of infrared radiation have in common.

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- c** Explain how energy is transferred by radiation. State whether particles are required for this method of energy transfer.

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#### **Task 4: Energy resources**

- 1** Wood and coal are two different types of energy resources. Describe the difference between them in terms of renewable and non-renewable energy sources.

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- 2** Describe how electricity is generated in a power station by completing the table below.  
Use these phrases:

**heats water to steam      generates electricity**  
**spins the generator      burns the fuel**

<b>Part of the power station</b>	<b>Function</b>
furnace	
boiler	
turbine	
generator	



## Task 5: Energy, power, and work done

1 Explain the difference between energy and power by filling in the table below. Use the following phrases to help you:

**increases    joule    stays the same    watt**

	<b>Energy</b>	<b>Power</b>
Unit		
How this quantity changes as the circuit component is left running		

2 An incandescent light bulb and an energy-saving light bulb have power ratings of 40 W and 12 W respectively.

a Calculate the energy transferred by both light bulbs over 10 hours in kWh. Show your working.

Remember:  $1000 \text{ W} = 1 \text{ kW}$

energy (kWh) = power (kW)  $\times$  time (h)

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b Compare the costs of running these two light bulbs over a 10-hour period. You should include the relative amounts of fuel used in each case.

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**3 a** Pete pulls a pulley and lifts a 20 N weight by 0.5 m. Calculate the work done.

Work done = force (N) × distance moved (m)

$$= \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$$

$$= \underline{\hspace{4cm}} \text{ J}$$

**b** Pete uses the pulley again to lift another weight. Pete's energy supplied 40 J to lift the weight. The weight gains 30 J. Calculate the amount of energy dissipated to the surroundings. Show your working.

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